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EXAMINER	
COUGHLAN, PETER D	
ART UNIT	**PAPER NUMBER**
2129	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of Allowability	Application No. 10/825,032	Applicant(s) HAUDRICH ET AL.	
	Examiner PETER COUGHLAN	**Art Unit** 2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *2/19/2009*.

2. ☒ The allowed claim(s) is/are *renumbered claims 1-47*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Examiner's Amendments / Reasons for Allowance

1. An Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

In the Claims

2. The following claims have been amended as follows:

Renumbered claim 20 is to read; The computer-implemented method of claim 19, further comprising the processor determining an accuracy of the aeroelastic flutter characteristics determined using the trained neural network.

Renumbered claim 21 is to read; The computer-implemented method of claim 19, further comprising: the processor determining a weight vector in the trained neural network; and the processor determining a bias value in the trained neural network.

Renumbered claim 22 is to read; The computer-implemented method of claim 21, wherein the processor determining the aeroelastic flutter characteristics comprises: the processor multiplying received input parameters by the weight vector to generate weighted parameters; the processor summing the weighted parameters and the bias

value to generate a summed input; and the processor applying the summed input to a transfer function associated with a neuron in the trained neural network.

Renumbered claim 30 is to read; The computer-implemented method of claim 29, wherein the processor receiving at least one input parameter comprises: the processor receiving a weight; and the processor receiving location of the weight on the aircraft structure.

Renumbered claim 31 is to read; The computer-implemented method of claim 29, wherein the processor applying the predetermined neural network transfer function comprises: the processor multiplying the at least one input parameter with a weight vector to produce at least one weighted input parameter; the processor summing together the at least one weighted input parameter and a bias value to generate a summed value; and the processor applying a neuron transfer function to the summed value.

Renumbered claim 32 is to read; The computer-implemented method of claim 29, wherein the aeroelastic flutter analysis result comprises the flutter speed at a damping value.

Renumbered claim 33 is to read; The computer-implemented method of claim 29, wherein the aeroelastic flutter analysis result comprises the flutter frequency at a damping value.

Renumbered claim 34 is to read; The computer-implemented method of claim 29, wherein the aeroelastic flutter analysis result comprises the flutter speed and the associated flutter frequency at a damping value.

Renumbered claim 35 is to read; The computer-implemented method of claim 29, wherein the aeroelastic flutter analysis result comprises a contour plot of store loadings.

Renumbered claim 23 is to read; The computer-implemented method of claim 19, wherein the structure is an aircraft.

Renumbered claim 24 is to read; The computer-implemented method of claim 23, wherein the step of the processor determining aeroelastic flutter characteristics of the structure based in part on the trained neural network is performed after the completed repair is completed and before the aircraft is used for flight.

Renumbered claim 25 is to read; The computer-implemented method of claim 19, wherein the structure is at least one of a stabilator, a wing, an elevator, a canard, an aileron, a flap, a spoiler, a stabilizer, a tail section, and a rudder of *an* aircraft.

Renumbered claim 26 is to read; The computer-implemented method of claim 19, wherein the neural network is a feed forward neural network.

Renumbered claim 27 is to read; The computer-implemented method of claim 19, wherein the step of the processor determining input parameters further comprises: the processor determining a weight; and the processor determining a location of the weight relating to the one or more completed repairs performed on the structure.

Renumbered claim 28 is to read; The computer-implemented method of claim 27, wherein the weight and the location of the weight relating to the one or more completed repairs performed on the structure exceed a predetermined category of approved repair parameters.

Renumbered claim 36 is to read; The computer-implemented method of claim 29, wherein the step of the processor applying the predetermined neural network transfer function to the at least one input parameter to generate the aeroelastic flutter analysis result is performed after the completed repair is completed and before the aircraft structure is used in flight.

3. Authorization for this Examiner’s Amendment was given in by a fax from Mr. Timothy K. Klintworth (Reg. No. 46162) on 4/8/2009.

4. Renumbered Claims 19 and 29 has been amended to read:

Claim 19.

A computer implemented method of performing aeroelastic flutter analysis to determine the aeroelastic flutter characteristics from one or more completed repairs performed on a structure, the computer implemented method comprising:

a processor determining input parameters relating to one or more completed repairs performed on a structure;

the processor determining a training set of characteristic I/O pairs;

the processor generating a neural network;

the processor training the neural network using the training set to generate a trained neural network;

the processor determining aeroelastic flutter characteristics of the structure based in part on the trained neural network in order to determine at least one of a flutter frequency and a flutter speed of the structure with the one or more completed repairs; and

the processor determining whether the aeroelastic flutter characteristics of the structure with one or more completed repairs are acceptable.

Claim 29.

A computer implemented method of performing aeroelastic flutter analysis, the computer implemented method comprising:

a processor receiving at least one input parameter related to a completed repair of an aircraft structure;

the processor applying a predetermined neural network transfer function to the at least one input parameter to generate an aeroelastic flutter analysis result comprising at least one of a flutter frequency and a flutter speed related to the completed repair of the aircraft structure, wherein the aeroelastic flutter analysis result is for determining whether the aircraft structure with the completed repair is acceptable for flight; and

the processor outputting the result.

5. Authorization for the amendments has been given by Mr. Tim Klintworth by a fax received 7/10/2009

6. The following in an Examiner's statement for reasons for allowance:

Claims are considered allowable since when reading the claims in light of the specification, as per MPEP §2111.01 or Toro Co. v. White Consolidated Industries Inc., 199 F.3d 1295, 1301, 53 USPQ2d 1065, 1069 (Fed. Cir. 1999), none of the references of record alone or in combination disclose or suggest the combination of limitations specified in independent claims. The cited art taken alone or in combination fails to teach the claimed invention of:

An aeroelastic analysis system for analyzing flutter relating to a completed repair of a structure, the system comprising: an input module configured to receive one or more input parameters associated with aeroelastic characteristics of a structure the one or more input parameters relating to a completed repair of the structure a neural network module coupled to the input module and configured to generate a transformation of the one or more input parameters to produce at least one aeroelastic flutter analysis result the transformation based in part on a trained neural network wherein the at least one aeroelastic flutter analysis result comprises at least one of a flutter frequency and a flutter speed for determining whether the aeroelastic flutter characteristics of the structure with the completed repair are acceptable. (Claim 1)

A computer-implemented method of performing aeroelastic flutter analysis to determine the aeroelastic flutter characteristics from one or more completed repairs performed on a structure, the method comprising: a processor determining input parameters relating to one or more completed repairs performed on a structure; the processor determining a training set of characteristic 1/0 pairs; the processor generating a neural network; the processor training the neural network using the training set to generate a trained neural network; the processor determining aeroelastic flutter characteristics of the structure based in part on the trained neural network in order to determine at least one of a flutter frequency and a flutter speed of the structure with the one or more completed repairs; and the processor determining whether the aeroelastic flutter characteristics of the structure with the one or more completed repairs are acceptable. (Renumbered claim 19)

A computer-implemented method of performing aeroelastic flutter analysis, the method comprising; a processor receiving at least one input parameter related to a completed repair of an aircraft structure; the processor applying a predetermined neural network transfer function to the at least one input parameter to generate an aeroelastic flutter analysis result comprising at least one of a flutter frequency and a flutter speed related to the completed repair of the aircraft structure, wherein the aeroelastic flutter analysis result is for determining whether the aircraft structure with the completed repair is acceptable for flight; and the processor outputting the result. (Renumbered claim 29)

One or more processor instructions stored in one or more storage devices, the one or more processor readable instructions, when executed by a processor instructing the processor to perform the method comprising: receiving at least one input parameter related to a completed repair of an aircraft structure applying a predetermined neural network transfer function to the at least one input parameter to generate an aeroelastic flutter analysis result comprising at least one of a flutter frequency and a flutter speed related to the completed repair of the structure wherein the aeroelastic flutter analysis result is for determining whether the aircraft structure with the completed repair is acceptable for flight. (Renumbered claim 37)

One or more processor readable instructions stored in one or more storage devices, the one or more processor readable instructions, when executed by a

processor instructing the processor to perform the method comprising; receiving a mass input related to a completed repair; receiving a location of the mass on an aircraft structure multiplying the mass input and location with a weight vector to produce weighted input parameters; summing together weighted input parameters and a bias value to generate a summed value; applying a neuron transfer function to the summed value to generate an aeroelastic flutter analysis result comprising at least one of a flutter frequency and a flutter speed, wherein the aeroelastic flutter analysis result is for determining whether the aircraft structure with the completed repair is acceptable for flight; and outputting the aeroelastic flutter analysis result. (Renumbered claim 42)

An aeroelastic flutter analysis system, the system comprising: means for receiving input parameters relating to a completed repair of an aircraft structure, means for applying a neural network transfer function to the input parameters to generate an aeroelastic flutter analysis result, comprising at least one of a flutter frequency and a flutter speed wherein the aeroelastic flutter analysis result is for determining whether the aircraft structure with the completed repair is acceptable for flight; and means for outputting the result. (Renumbered claim 44)

7. Renumbered claims 1-47 are allowed.

8. The closest prior art teaches (‘Next Generation Structural Heath Monitoring and its Integration into Aircraft Design’: referred to as **Boller**)

An aeroelastic analysis system for analyzing flutter relating to a completed repair of a structure, the system comprising: an input module configured to receive one or more input parameters associated with aeroelastic characteristics of a structure. (**Boller,** Fig. 14, p396, C2:19-34, abstract; ‘Input module’ of applicant is disclosed by the output of the sensors in Fig. 14 of Boller. ‘Aeroelastic characteristics’ of applicant is equivalent to ‘aeroelasticity’ of Boller.) and a neural network module coupled to the input module (**Boller,** Fig. 14, p396, C2:19-34, abstract; Boller uses sensors which produce data and neural networks to analyze data, then it is inherent that there exists some ‘input module’ which take data from the sensor to input into the neural network of Boller.) and configured to generate a transformation of the one or more input parameters to produce at least one aeroelastic flutter analysis result. (**Boller,** Fig. 14, p396, C2:19-34, abstract; ‘Aeroelastic analysis’ of applicant is equivalent to ‘aeroelasticity’ of Boller.) (Claim 1)

Complementary art teaches (‘Elements of Artificial Neural Networks’: referred to as **Mehrotra**) The transformation based in part on a trained neural network. (**Mehrotra,** p103:1 through p104:16; ‘Trained neural network’ of applicant is accomplished by ‘back propagation’ of Mehrotra.) (Claim 1)

The processor determining a training set of characteristic I/O pairs (**Mehrotra,** p103:1 through p104:16; ‘Training set of characteristic I/O pairs’ of applicant is equivalent to ‘back propagation’ of Mehrotra.); the processor generating a neural

network. (**Mehrotra,** Fig 4.20; ‘Generating a neural network’ of applicant is disclosed by the illustration of the tiling algorithm of Mehrotra.) (Claim 17)

The processor applying a predetermined neural network transfer function. (**Mehrotra,** p11, Figure 1.5; The ’transfer function’ of applicant is equivalent to ‘$f(w_1x_1 + \ldots + w_nx_n)$’ of Mehrotra.) (Claim 21)

Applying a predetermined neural network transfer function. (**Mehrotra,** p11, Figure 1.5; The ’transfer function’ of applicant is equivalent to ‘$f(w_1x_1 + \ldots + w_nx_n)$’ of Mehrotra.) (Claim 28)

Multiplying the mass input and location with a weight vector to produce weighted input parameters (**Mehrotra,** p11, Figure 1.5; The ‘Multiplying the mass input … with a weight vector’ of applicant is the multiplication of each x_is and w_is in node ‘f’ of Mehrotra.); summing together weighted input parameters and a bias value to generate a summed value (**Mehrotra,** p11, Figure 1.5; The ‘summing’ of applicant is the summation of the products of all the x_is and w_is in node ‘f’ of Mehrotra.); applying a neuron transfer function. (**Mehrotra,** p11, Figure 1.5; The ’transfer function’ of applicant is equivalent to ‘$f(w_1x_1 + \ldots + w_nx_n)$’ of Mehrotra.) (Claim 29)

Means for applying a neural network transfer function. (**Mehrotra,** p11, Figure 1.5; The ’transfer function’ of applicant is equivalent to ‘$f(w_1x_1 + \ldots + w_nx_n)$’ of Mehrotra.) (Claim 30)

Complementary art teaches (‘Integrated Decision Support for Aviation Safety Inspectors’, referred to as **Luxhoj)** the one or more input parameters relating to a completed repair of the structure. (**Luxhoj,** p382:1-24; ‘Completed repair’ of applicant is equivalent to ‘repaired structures’ of Luxhoj.) (Claim 1)

The processor training the neural network using the training set to generate a trained neural network. (**Luxhoj,** p386:1 through p387:16; ‘Trained neural network’ of applicant is disclosed by having ‘training sets of data patterns’ of Luxhoj.) (Claim 17)

The processor outputting the result. (**Luxhoj,** p390:18 through p391:6; ‘Outputting the results’ of applicant is equivalent to ‘output values of a PNN’ of Luxhoj.) (Claim 21)

Outputting the aeroelastic flutter analysis result. (**Luxhoj,** p390:18 through p391:6; ‘Outputting’ of applicant is equivalent to ‘output values of a PNN’ of Luxhoj.) (Claim 29)

Means for outputting the result. (**Luxhoj,** p390:18 through p391:6; ‘Outputting the results’ of applicant is equivalent to ‘output values of a PNN’ of Luxhoj.) (Claim 30)

Complementary art teaches (‘Small Business Innovation Research to Support Aging Aircraft’, referred to as **NMAB-497**) a computer implemented method of performing aeroelastic flutter analysis to determine the aeroelastic flutter characteristics from one or more completed repairs performed on a structure, the method comprising: a processor determining input parameters relating to one or more completed repairs

performed on a structure. (**NMAB-497,** p11:8-25; ‘Input parameters’ of applicant is illustrated by ‘materials and processes’ of NMAB-497.) (Claim 17)

A computer implemented method of performing aeroelastic flutter analysis, the method comprising: a processor receiving at least one input parameter related to a completed repair of an aircraft structure. (**NMAB-497,** p11:8-25; ‘Input parameters’ of applicant is illustrated by ‘materials and processes’ of NMAB-497.) (Claim 21)

Receiving at least one input parameter related to a completed repair of an aircraft structure.(**NMAB-497,** p11:8-25; ‘Input parameters’ of applicant is illustrated by ‘materials and processes’ of NMAB-497.) (Claim 28)

Receiving a mass input related to a completed repair; receiving a location of the mass on an aircraft structure. (**NMAB-497,** p11:8-25; ‘Weight and location on the structure’ of applicant is illustrated by ‘materials and processes’ of NMAB-497. It is the Examiner’s opinion that one skilled within the art would understand that both the location of the repair and the mass of the materials used for the repair is critical information for analysis of the repair. This is due to following the repair both aerodynamics and the center of gravity of the aircraft can be altered.) (Claim 29)

Means for receiving input parameters relating to a completed repair of an aircraft structure. (**NMAB-497,** p11:8-25; ‘Input parameters’ of applicant is illustrated by ‘materials and processes’ of NMAB-497.) (Claim 30)

9. The references either by themselves or in combination fails to teach wherein the at least one aeroelastic flutter analysis result comprises at least one of a flutter

frequency and a flutter speed for determining whether the aeroelastic flutter characteristics of the structure with the completed repair are acceptable. (Claim 1)

The processor determining aeroelastic flutter characteristics of the structure based in part on the trained neural network in order to determine at least one of a flutter frequency and a flutter speed of the structure with one or more completed repairs; determining whether the aeroelastic flutter characteristics of the structure with the one or more completed repairs are acceptable. (Claim 17)

The at least one input parameter to generate an aeroelastic flutter analysis result comprising at least one of a flutter frequency and a flutter speed related to the completed repair of the aircraft structure wherein the aeroelastic flutter analysis result is for determining whether the aircraft structure with the completed repair is acceptable for flight. (Claim 21)

The at least one input parameter to generate an aeroelastic flutter analysis result comprising at least one of a flutter frequency and a flutter speed related to the completed repair of the structure wherein the aeroelastic flutter analysis result is for determining whether the aircraft structure with the completed repair is acceptable for flight. (Claim 28)

The summed value to generate an aeroelastic flutter analysis result comprising at least one of a flutter frequency and a flutter speed wherein the aeroelastic flutter analysis result is for determining whether the aircraft structure with the completed repair is acceptable for flight (Claim 29)

The input parameters to generate an aeroelastic flutter analysis result, comprising at least one of a flutter frequency and a flutter speed wherein the aeroelastic flutter analysis result is for determining whether the aircraft structure with the completed repair is acceptable for flight (Claim 30)

10. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Peter Coughlan whose telephone number is (571) 272-5990, Monday through Friday from 7:15 a.m to 3:45 p.m. or contact the Supervisor Mr. David Vincent at (5710 272-3080.

/P. C./

Examiner, Art Unit 2129

Peter Coughlan

10/5/2009

/David R Vincent/

Supervisory Patent Examiner, Art Unit 2129